

CLAIMS

1. A semiconductor device comprising:  
a substrate,  
an integrated circuit including a thin film transistor,  
5 an antenna having a conducting wire, and  
an insulating film over the conducting wire,  
wherein the integrated circuit and the antenna are formed over the substrate to  
be electrically connected to each other, and  
fine particles of a soft magnetic material are included in the insulating film.

10 2. A semiconductor device comprising:  
a substrate,  
an integrated circuit including a thin film transistor,  
an antenna having a conducting wire, and  
15 a resin film over the conducting wire,  
wherein the integrated circuit and the antenna are formed over the substrate to  
be electrically connected to each other, and  
fine particles of a soft magnetic material are included in the resin film.

20 3. A semiconductor device comprising:  
a substrate,  
an integrated circuit including a thin film transistor,  
an antenna having a conducting wire,  
a first insulating film covering the conducting wire and the thin film transistor,  
25 and  
a second insulating film over the first insulating film covering the conducting  
wire,  
wherein the integrated circuit and the antenna are formed over the substrate to  
be electrically connected to each other, and  
30 fine particles of a soft magnetic material are included in the second insulating

film.

4. A semiconductor device comprising:

a substrate,

5 an integrated circuit including a thin film transistor,

an antenna having a conducting wire,

an insulating film covering the conducting wire and the thin film transistor, and

a resin film over the insulating film covering the conducting wire,

wherein the integrated circuit and the antenna are formed over the substrate to

10 be electrically connected to each other, and

fine particles of a soft magnetic material are included in the resin film.

5. A semiconductor device comprising:

a substrate,

15 an integrated circuit including a thin film transistor,

an antenna having a conducting wire,

a first insulating film covering the thin film transistor,

a second insulating film over the first insulating film,

the conducting wire over the second insulating film, and

20 a third insulating film over the conducting wire,

wherein the integrated circuit and the antenna are formed over the substrate to  
be electrically connected to each other, and

fine particles of a soft magnetic material are included in the second insulating  
film and the third insulating film.

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6. A semiconductor device comprising:

a substrate,

an integrated circuit including a thin film transistor,

an antenna having a conducting wire,

30 a first insulating film covering the thin film transistor,

a second insulating film over the first insulating film,  
the conducting wire over the second insulating film,  
a third insulating film over the conducting wire, and  
a fourth insulating film over the third insulating film,  
5 wherein the integrated circuit and the antenna are formed over the substrate to  
be electrically connected to each other, and  
fine particles of a soft magnetic material are included in the second insulating  
film and the fourth insulating film.

10 7. A semiconductor device comprising:  
a substrate,  
an integrated circuit including a thin film transistor,  
an antenna having a conducting wire,  
a first insulating film at least covering the conducting wire, and  
15 a second insulating film covering the first insulating film and the thin film  
transistor,  
wherein the integrated circuit and the antenna are formed over the substrate to  
be electrically connected to each other,  
the conducting wire is formed from a same material as a gate electrode of the  
20 thin film transistor, and is formed on a same layer, and  
fine particles of a soft magnetic material are included in the first insulating  
film.

25 8. A semiconductor device comprising:  
a substrate,  
an integrated circuit including a thin film transistor,  
an antenna having a conducting wire, and  
an insulating film at least contacts with a side of the conducting wire,  
wherein the integrated circuit and the antenna are formed over the substrate to  
30 be electrically connected to each other, and

fine particles of a soft magnetic material are included in the insulating film.

9. A semiconductor device comprising:

a substrate,

5 an integrated circuit including a thin film transistor,

an antenna having a conducting wire, and

a resin film at least contacts with a side of the conducting wire,

wherein the integrated circuit and the antenna are formed over the substrate to be electrically connected to each other, and

10 fine particles of a soft magnetic material are included in the resin film.

10. The semiconductor device according to any one of Claims 1 to 9, wherein the integrated circuit and the antenna are formed over a flexible substrate.

15 11. The semiconductor device according to any one of Claims 1 to 9, wherein the conducting wire is formed by an electroplating method, an electroless plating method, a printing method, or a droplet discharging method.

20 12. The semiconductor device according to any one of Claims 1 to 9, wherein the conducting wire includes a first conductor and a second conductor covering the first conductor.

25 13. The semiconductor device according to Claim 12, wherein the second conductor is formed by an electroplating method, an electroless plating method, or a droplet discharging method.

30 14. The semiconductor device according to Claims 1 to 9, wherein the soft magnetic material is Fe; Co; Ni; an alloy including at least one of Fe, Co, and Ni;  $3Y_2O_3 \cdot 5Fe_2O_3$  (YIG);  $Fe_2O_3$ ; Fe-Si-Al alloy; Fe-Cr alloy; FeP alloy; a permalloy in which Ni or Ni-Fe alloy is added with at least one of Mo, Cu, Cr, and Nb; or a soft



ferrite.